Claims

What is claimed is:

1. A method used during the formation of a semiconductor device comprising the following steps:

forming a polysilicon layer;

etching said polysilicon layer with an etch comprising a pressure of from about 42 mTorr to about 78 mTorr, an upper power of from about 245 watts to about 455 watts, a lower power of from about 49 watts to about 91 watts, a halogen-containing gas flow rate of from about 35 sccm to about 65 sccm, and an oxygen-containing gas having an oxygen flow rate of from about 1.9 sccm to about 4.68 sccm.

2. The method of claim 1 wherein said environment comprises a pressure of from about 54 mTorr to about 66 mTorr.

3. The method of claim 1 wherein said environment comprises an upper power of from about 315 watts to about 345 watts.

4. The method of claim 1 wherein said environment comprises a lower power of from about 63 watts to about 77 watts

5. The method of claim 1 wherein said environment comprises a halogen-containing gas flow rate of from about 45 sccm to about 55 sccm.

6. The method of claim 1 wherein said environment comprises an oxygen-containing gas having an oxygen flow rate of from about 2.4 sccm to about 4.0 sccm.

7. The method of claim 1 wherein said environment comprises a pressure of from about 54 mTorr to about 66 mTorr, an upper power of from about 315 watts to about 345 watts, a lower power of from about 63 watts to about 77 watts, a halogen-containing gas flow rate of from about 45 sccm to about 55 sccm, and an oxygen-containing gas having an oxygen flow rate of from about 2.4 sccm to about 4.0 sccm.

8. The method of claim 1 wherein said environment comprises a pressure of about 60 mTorr, an upper power of about 350 watts, a lower power of about 70 watts, a halogen-containing gas flow rate of about 50 sccm, and an oxygen-containing gas having an oxygen flow rate of between about 2.7 sccm and about 3.6 sccm.

9. The method of claim 1 wherein during said step of etching, said halogen-containing gas is a material selected from the group consisting of Br, HBr, CF_4, Cl_2, HCl, SF_6, and NF_3.

10. The method of claim 9 wherein during said step of etching, said oxygen-containing gas is a material selected from the group consisting of HeO_2 and O_2.

11. The method of claim 1 wherein during said step of etching, said etch further comprises a helium gas flow rate of from about 70 sccm to about 130 sccm.

12. A method used during the formation of a semiconductor device comprising the following steps:

forming a polysilicon layer;

etching said polysilicon layer with a first etch comprising a halogen-containing gas flow rate of from about 35 sccm to about 65 sccm, an oxygen-containing gas having an oxygen flow rate of from about 1.9 sccm to about 2.7 sccm; and

subsequent to said first etch, etching said polysilicon layer with a second etch comprising a halogen-containing gas flow rate of from about 35 sccm to about 65 sccm and an oxygen-containing gas having an oxygen flow rate of from about 3.6 sccm to about 4.7 sccm.

13. The method of claim 12 wherein said first etch further comprises a top power in the range of from about 245 to about 315 watts and said second etch further comprises a top power in the range of from about 385 to about 455 watts.

14. The method of claim 12 wherein said first and second etches each further comprise a helium gas flow rate of from about 70 sccm to about 130 sccm.

15. The method of claim 12 wherein said halogen-containing gas is selected from the group consisting of Br, HBr, CF_4, Cl_2, HCl, SF_6, and NF_3.

16. The method of claim 12 further comprising the step of increasing said flow rate of said oxygen-containing gas after said first etch to result in said flow rate of said second etch wherein said polysilicon layer is etched during said increase of said flow rate of said oxygen-containing gas.

17. The method of claim 12 further comprising the step of anisotropically etching said polysilicon layer during said first etching step to result in a substantially vertical surface.

18. The method of claim 17 wherein said polysilicon layer is formed over a semiconductor wafer and said vertical surface comprises a lower portion proximal to said wafer and an upper portion distal to said wafer, further comprising the step of etching said lower portion at a faster isotropic rate than an etch rate of said upper portion during said second etch.

19. A method used during the formation of a semiconductor device comprising the following steps:

providing a semiconductor substrate assembly having at least first and second features therein in spaced relation to each other, wherein said first and second features define an opening therebetween;

providing a blanket polysilicon over said semiconductor substrate assembly and within said opening;

forming a patterned photoresist layer over said blanket polysilicon layer;

etching said polysilicon layer within said opening with a first etch;

subsequent to said first etch, etching said polysilicon layer within said opening with a second etch comprising a halogen-containing gas flow rate of from about 35 sccm to about 65 sccm and an oxygen-containing gas having an oxygen flow rate of from about 3.6 sccm to about 4.7 sccm.

20. The method of claim 19 wherein said step of etching with said first etch comprises a halogen-containing gas flow rate of from about 35 sccm to about 65 sccm, and an oxygen-containing gas having an oxygen flow rate of from about 1.9 sccm to about 2.7 sccm.

21. The method of claim 20 wherein said first etch further comprises a top power in the range of about 245 to about 315 watts and said second etch further comprises a top power in the range of from about 385 to about 455 watts.

22. The method of claim 19 wherein said second etch further comprises a helium gas flow rate of from about 70 sccm to about 130 sccm.

23. A method used during the formation of a semiconductor device comprising the following steps:

forming a polysilicon layer;

etching said polysilicon layer, wherein said etch of said polysilicon results in the formation of polysilicon stringers;

etching said polysilicon stringers with an etch comprising a halogen-containing gas and an oxygen-containing gas.

24. The method of claim 23 wherein said step of etching said polysilicon stringers further comprises a halogen-containing gas flow rate of from about 35 sccm to about 65 sccm, and an oxygen-containing gas having an oxygen flow rate of from about 1.9 sccm to about 4.7 sccm.

25. The method of claim 23 wherein said step of etching said polysilicon stringers further comprises a pressure of from about 54 mTorr to about 66 mTorr, an upper power of from about 315 watts to about 388 watts, a lower power of from about 63 watts to about 77 watts, a halogen-containing gas flow rate of from about 45 sccm to about 55 sccm, and an oxygen-containing gas having an oxygen flow rate of from about 2.4 sccm to about 4.0 sccm.

26. The method of claim 23 wherein said etch consists essentially of a halogen-containing gas and an oxygen-containing gas.